Please delete the claims numbered 26 through 38. Please enter the following new claims:

39. A set of coded algorithms, computational processing means, for valuation of a security, a basket of cash receipts constituting a single security, or an aggregated portfolio, providing means for mathematical valuation and sensitivity functions, wherein providing means to determine a singular yield-to-maturity value for a portfolio, useful to identifying its composite yield basis, wherein said algorithms also providing means to determine yield-to-maturity value for a single security isomorphic to said security's yield-to-maturity, wherein also providing means to determine a composite yield basis for the individual cash receipts, cash-flows, or premiums, comprising a basket within a single security, said yield-to-maturity values useful to quoting the earnings of said security or portfolio and to projecting the change in the price of said security or portfolio respective a change in yield curve respective time, said algorithms satisfying the pricing function, 1.1, said pricing function providing means for valuation and sensitivity functions for fixed-income bond, equity stock, or insurance premium, securities respective endogenous variables of C, Y and T, said pricing function comprising:

$P = f\{ C, Y, T \}$ where C, Y, and T are variables endogenous to the security
P = Market Price
C = Cash Receipts, periodic coupon, dividend or premium payments
Y = Yield, a single term relating security's return, relative to P, C, T
T = Time, a terminal or continuous measure of the life of the security;

wherein said algorithms also determining a governing yield value on the spot forward curve, said alternate algorithms comprising Formula 1.2, Yield M, or Formula 1.2d, Yield Md,:

$$\text{Yield M} = \frac{\sum \text{(Maturity} \times \text{Portfolio Coefficient} \times \text{YTM), for all issues}}{\sum \text{(Maturity} \times \text{Portfolio Coefficient), for all issues;}}$$

$$\text{Yield Md} = \frac{\sum \text{(Duration} \times \text{Portfolio Coefficient} \times \text{YTM), for all issues}}{\sum \text{(Duration} \times \text{Portfolio Coefficient), for all issues.}}$$

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40. The invention of claim 39, which further comprises a set of coded algorithms, computational processing means, for valuation of a security, a basket of cash receipts constituting a single security, or an aggregated portfolio, providing means for mathematical valuation and sensitivity functions, comprising means for generating valuation and sensitivity data, useful for establishing hedge ratios and immunization, said algorithms comprising means to identifying yield, duration, and convexity of said security or portfolio, and said algorithms comprising means to establishing sensitivity values useful for projecting the change in price of said security or portfolio respective a change in yield curve by Formulae S.1, S.3, and S.4,:

D1 Cont'd

relation of price to yield-to-maturity, in semi-annual, S.1, or generalized form, S.1n;

relation of change in price for change in ytm, modified annualized duration, S.3c, cn;

relation of change in the change in ytm, modified annualized convexity, S.4c, S.4cn.

41. The invention of claim 39, which further comprises a set of coded algorithms, computational processing means, for valuation of a security, a basket of cash receipts constituting a single security, or an aggregated portfolio, providing means for mathematical valuation and sensitivity functions, comprising means for generating valuation and sensitivity data, useful for establishing hedge ratios and immunization, said algorithms comprising means to identifying yield, duration, and convexity of said security or portfolio, and said algorithms comprising means to establishing sensitivity values useful for projecting the change in price of said security or portfolio respective a change in yield curve by Formulae S.2, 1.3 and 1.4:

relation of price to yield-to-maturity, in semi-annual, S.2c, or generalized form, S.2cn;

change in price for change in yield, modified annualized duration, 1.3cw and 1.3cn;

change in the change in yield, modified annualized convexity, 1.4c, 1.4cn, 1.4cvn.

42. A process for the manufacture of financial data using the endogenous variables of a financial security, useful to estimating change in the security's price given change in its yield, and useful to quoting yield and for setting hedge ratios and immunization, which comprises:

identifying the data values for the security's endogenous variables, of C, Y, T, per 1.1;

determining governing yield, for a single security issue, or for a portfolio of issues, or for a basket of divisible cash receipts, wherein applying processing function Formula 1.2 or 1.2d; if a security with semi-annual coupon receipts, utilizing its yield-to-maturity, which further comprises calculating yield-to-maturity per the Formula S.1 or the Formula S.2;

D1 Contd

determining arbitrage spreads between Yield M and spot, and Yield M and YTM;

calculating the security's price, utilizing the security's values of C, Yield M, and T; if it is fixed-income by solving price, means for performing either S.1 or S.2, or both separately

determining measures of the security's pricing sensitivities, duration and convexity, duration per the Formula S.3 or 1.3, and convexity per the Formula S.4 or 1.4, respectively.

43. A method for valuing a security by its endogenous variables, useful to useful to quoting yield and for setting hedge ratios and immunization and to estimating change in the security's price given change in its yield with respect to time, comprising steps of:

identifying the data values for the security's endogenous variables, of C, Y, T, per 1.1;

establishing Yield M, means for performing process 1.2, or using spot or quote values;

utilizing values of C, Yield M, T, calculating the security's price, if it is fixed-income:

by solving for price, by processing either S.1 or S.2, or both separately;

utilizing values of C, Yield M, T, calculating duration and convexity price sensitivity:

by solving for duration, by processing S.3 or 1.3, respective S.1 or S.2;

by solving for convexity, by processing S.4 or 1.4, respective S.1 or S.2.

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44. A method for valuing a financial portfolio, containing more than one divisible issue, by singular portfolio (P) data values of endogenous variables C^P, Y^P, T^P, said method to comparing portfolios and to hedging, immunizing and replicating values of a portfolio, comprising steps of:

identifying the data values for each issue's endogenous variables of C, Y, T, per 1.1;

generating the portfolio coefficients for each issue in portfolio, by:

Portfolio Coefficient, per each Issue = Present Value^I/Present Value^P;

Present Value^I = (AI + (Bid Price×Face Value)), per Issue (I);

Present Value^P = Σ (AI+(Bid Price×Face Value), for all Issues;

D1 Cont'd

generating aggregate portfolio (P) data relating portfolio's value, by:

Present Value^P = Σ (AI + (Bid Price × Face Value), for all Issues;

Accrued Interest^P = Σ Accrued Interest, AI, for all Issues;

Face Value^P = Σ Face Value, for all Issues;

Implied Price^P = (Present Value^P – AI^P)/ Σ Face Value for all Issues;

generating aggregate portfolio (P) data relating portfolio's variables:

C^P = Cash Flow^P = Σ C × Portfolio Coefficient, for all Issues;

T^P = Time^P = Σ Maturity × Portfolio Coefficient, for all Issues;

Y^P = Yield^P = Σ Yield × Portfolio Coefficient, for all Issues;

if for a portfolio of U. S. Treasury issues, C^P, Y^P, T^P are:

C^P = Coupon^P = Σ Coupon × Portfolio Coefficient, for all Issues;

T^P = Maturity^P = Σ Maturity × Portfolio Coefficient, for all Issues;

Y^P = Yield^P = Σ Yield × Portfolio Coefficient, for all Issues

wherein Yield by Yield M, by zero spot for T, or by YTM of S.1 or S.2;

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processing C, Y, T, per issue, portfolio's duration and convexity:

$$\text{Duration}^P = \sum \text{Duration} \times \text{Portfolio Coefficient, for all Issues;}$$

$$\text{Convexity}^P = \sum \text{Convexity} \times \text{Portfolio Coefficient, for all Issues.}$$

or utilizing portfolio values, C^P, Y^P, T^P, calculating

Duration, means for performing S.3 or 1.3, respective S.1 or S.2;

Convexity, means for performing S.4 or 1.4, respective S.1 or S.2;

establishing Yield M, means for performing process 1.2, or using spot or quote Y.

45. A method for estimating change in price of a security. or of an aggregated portfolio, respective change in yield, instantaneous or as occurring over time, useful to projecting and forecasting future values of said security or portfolio given change in yield over time, comprising steps of:

Dl Contd

utilizing data values of said security's Yield M, Duration K, and Convexity V, which compute by the coded mathematical programming functions of the Formulae 1.2. 1.3 and 1.4;

identifying change in said Yield M data value at instant or as occurring over time;

determining the change in price of the security given said change in said Yield M by implementing factorization, wherein utilizing K for duration, Δ Price, due to Duration (K):

$$\text{A:} \quad \Delta \text{ Price, due to Duration (K)} = K \times \Delta\ Y;$$

determining the change in price of the security given said change in said Yield M by implementing factorization, wherein utilizing V for convexity, Δ Price, due to Convexity (V):

$$\text{B:} \quad \Delta \text{ Price, due to Convexity (V)} = \tfrac{1}{2} \times V \times (\Delta\ Y)^2;$$

summing the values determined by1.10k and 1.10v, A+B, Δ Price, due to K and V:

$$\Delta \text{ Price} = (K \times \delta Y) + (\tfrac{1}{2} \times V \times (\delta Y)^2);$$

determining arbitrage spread of computed Δ Price versus actual notched Δ Price.

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46. The method of claim 45, which further comprises an universal factorization:

$$\Delta\,\text{Price} = (-\left|\text{Duration}\right| \times \delta Y) + (\tfrac{1}{2} \times \text{Convexity} \times (\delta Y)^2);$$

wherein $\delta Y \cong \Delta Y = \Delta$Yield M or ΔYTM of S.2, or ΔYTM of S.1,

Duration = Formula 1.3, or S.3, and Convexity = Formula 1.4, or S.4.

47. The method of claim 45, which further comprises adding a derivative respecting time, and further comprises adding any accrued interest, wherein using dirty price within A and B:

$$\Delta P = A + B + C + D$$

D1 Contd

wherein,

ΔP = change in bid price, for given changes in yield and time,

A = -abs(Duration) × Price(dirty) × ΔY

B = ½ × Convexity × Price(dirty) × $(\Delta Y)^2$

C = Theta × Price(dirty) × Δt

D = -(Δ Accrued Interest, for given Δt),

and wherein,

Y (YTM), by Formula S.1, or Formula S.2 or Formula 1.2,

Duration and Convexity, Formulae S.3 or 1.3, and S.4 or 1.4,

Theta (θ), such a theta: $\theta = 2\ln(1+r/2)$, r = ytm,

Price (dirty) equals bid price plus accumulated interest,

Δt is elapsed time between two points whereby estimations are made,

ΔP rounded to nearest pricing gradient, ΔP occurring Δt, determining arbitrage spread of computed Δ Price versus actual notched Δ Price.

48. An apparatus, generating financial data, an analytic valuation engine, useful for automated computation of values and sensitivities for a security or portfolio, comprising:

means to input values from a data-feed, stored memory or by simulation, for a security, or for securities in a portfolio, with respect to endogenous variables C, Y and T;

means calculating the governing yield, the Yield M, for the security or for portfolio, applying coded algorithms of Formulae 1, sending calculated value(s) to the arbitrage engine, together with the security's market yield values determined by Formula S.1 and Formula S.2;

means sending governing yield value and the market yield values to processing, wherein Yield M data, computing duration and convexity (and theta) data per Formulae 1.3, 1.4 (1.111), and wherein per market yield data, duration and convexity (and theta) data, by Formula S.1 per Formulae S.3, S.4 (1.111), and by Formula S.2 per Formulae 1.3, 1.4 (1.111);

D1 Cont'd

means sending the governing yield, and its convexity, duration (and theta), data set to data storage, and means computing factorization per Formula 1.10 (1.111), whereas sending market yield data to storage and means computing factorization per Formula S.5 (or 1.111);

means to tabling, charting and rendering said generated data of security or portfolio.

49. An apparatus, processing data or transaction, automated arbitrage engine, useful for automated computation and identification of profitable arbitrage differentials, comprising:

means to input data from storage or data-stream of analytic valuation engine, said apparatus updating market pricing and market yield of security and from real-time data-feed;

means computing an arbitrage differential between market yield and governing yield;

means computing an arbitrage differential between precise price change and actual;

means adjusting said differentials by transaction costs or market bid and ask pricing;

means sorting arbitrage opportunities of securities by profit, spread or notch premium.

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50. An integrated computer-based financial information and transaction processing system providing analytic processing, assessment of arbitrage spreads and execution of transactions, useful for automated computation of values and sensitivities, for automated computation of arbitrage differentials, and for real-time processing of transactions based thereon, comprising:

business logic computational engines of two core server-based systems: an analytic valuation engine; and an automated arbitrage engine;

real-time financial data-feed, wherein each of the core business logic servers receiving market pricing data through said data-feed, wherein the signal data (i.e. for analytic valuation: of security typus, credit rating, C, T, P) are delivered to cores for computational processing;

porting connections between core business logic engines and from each engine to output, rendering and storage devices, such devices include printers, terminals and memory;

D1 Cont'd

automated control sequences to providing execution of computer-driven transactions;

tele-communications connections between system comprised of engines and external entities, such entities include the group of exchanges, broker/dealers, and investment entities;

protective devices, such include the group of encryption, gate-keepers and firewalls.

51. The invention of claim 50, which further comprises a business logic engine, to managing a mutual fund, such a fund a ladder-based U.S. Treasury portfolio, containing U.S. Notes and Bonds spanning the short and medium terms, wherein said fund managing to eliminate risk with guaranteed return at a minimum equivalent to the industry average return, wherein managing via said automated arbitrage differential identification and transaction to out-performing said industry average, wherein said system establishing and maintaining an indexed ladder portfolio, sequentially reinvesting matured issues at end of portfolio tenures.

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